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CHAPTER THREE:

MATERIALS

REINFORCING BARS

Reinforcing bars are required to be supplied from a source listed on the Department Approved List of Certified Uncoated Reinforcing Bar Manufacturers and WWR Fabricators and/or Certified Reinforcing Bar and WWR Epoxy Coaters. The most recent listings may be located at the following websites:

<http://www.in.gov/indot/div/mt/appmat/pubs/apl08.pdf>

<http://www.in.gov/indot/div/mt/appmat/pubs/apl07.pdf>

If the Fabricator plans to use ties to keep the reinforcing bars in position prior to and during the placement of concrete, the reinforcing is required to meet ASTM A 615 or A 706 standards.

The Technician will obtain verification samples at the jobsite for testing as detailed in the Frequency Manual.

PRESTRESSING STRAND

Typically, prestressing strands consist of uncoated seven-wire stress-relieved strands meeting the requirements of ASTM A 416 for the size and grade specified or as shown on the approved shop drawings (Section **910.01 (b)**). The Technician is required to verify that a Type A certification covering the strand is received from the manufacturer before the strand is used in the work. Section **916** contains examples of the various required certification forms. The certification shall indicate the modulus of elasticity of the strand and the area of the strand used to calculate the modulus of elasticity. The DTE will provide the most current ASTM A 416 standard to the Technician so that the laboratory report may be compared to the current strand requirements.

CONCRETE

Sections **707.04 (c)** and **707.04 (d)** include the requirements for the concrete used in the precast prestressed structural members. The water-cementitious ratio of the concrete at the time of placement is required to be 0.420 or less.

CEMENT AND POZZOLANS

Cement and pozzolans are required to be stored in a clean, dry, place and protected from moisture until used. Cement or pozzolans which have become partially set or contain lumps are not used. Silica fume is sometimes added in high strength applications. The approved sources of cement and pozzolans may be located at the following website:

<http://www.in.gov/indot/div/mt/appmat/pubs/apl02.pdf>

AGGREGATES

Fine and coarse aggregates used in precast prestressed structural members are not required to be produced by a Certified Aggregate Producer Program (Section **904.01**). ITM 203 requires that sources supplying stone for precast prestressed concrete members have ledge samples obtained. This is not a requirement for aggregate sources supplying aggregates for precast concrete.

The coarse aggregate is required to be Class A or higher, Size No. 91 (Section **904.03**).

Lightweight coarse aggregates are sometimes incorporated into precast prestress structural members. This concrete may be referred to as lightweight concrete. The lightweight aggregates are typically used when the girder is very long. A Special Provision will be included in the contract document to detail the requirements for the use of this aggregate. The aggregate the Fabricator proposes to use is required to have aggregate quality tests conducted in accordance with ITM 203.

Fine aggregate is required to be natural sand, size No. 23, or crushed limestone, dolomite, gravel, or ACBF.

If aggregates are supplied from a CAPP source and are of the specified quality, no further testing will be required. If the aggregates are not supplied from a CAPP source and there is a concern with the quality or gradation of the aggregate, a point-of-use sample may be obtained in accordance with the Office of Materials Management Directive No. 202. The approved sources of aggregates may be located at the following website:

<http://www.in.gov/indot/div/mt/appmat/pubs/apl03.pdf>

ADMIXTURES

Portland cement concrete admixtures are required to be supplied from a source listed on the Department Approved List of PCC Admixtures and Admixture Systems. Admixtures Type A, D, F, or G may be used in accordance with Section **707.04 (c)**. High range water reducing (HRWR) and high range water reducing retarding (HRWRR) admixture systems may also be used. Admixtures Type B, C, or E may only be used when approved in writing. The concrete is required to be air entrained and meet the requirements of Section **702.05**. The approved sources of admixtures and admixture systems may be located at the following website:

<http://www.in.gov/indot/div/mt/appmat/pubs/apl22.pdf>

MIXING AND CURING WATER

Water proposed for use in mixing or curing is required to be in accordance with **913.01**.

CONCRETE PLANT

If the Fabricator produces the concrete, the Technician is required to inspect the storage, mixing, and transportation of the materials in the concrete. The materials are required to be stored, produced, and transported in accordance with Section **702**. The Technician is required to perform the inspection of the plant in accordance with ITM 405, Portland Cement Concrete Plant Inspection.

MIX DESIGNS

All mix designs are reviewed annually and approved by the Technician. If the Technician has a problem or question, the DTE will be contacted. The mix designs may be adjusted daily for fluctuations in aggregate moistures. A change in the cement source, pozzolan source, admixture type or source, and /or aggregate source will require the Fabricator to submit a new mix design. Some Fabricators use different mixes according to expected curing times. For example, a Fabricator may have a mix design with less cement than their "standard" mix that is used on a Friday when the members are required to cure all weekend in the forms. This practice is acceptable.

The standard mixes that most Fabricators use may be approved without a trial batch. However, some Special Provisions, such as for lightweight concrete, require a mix design to have a trial batch. The mix design is required to be approved by the DTE prior to the trial batch. All tests from the trial batch are required to meet the requirements of the Special Provisions and Section **707.04 (c)** before a mix design is approved for use. Compressive strength of the concrete is required to be in accordance with **707.04 (c)** or the required 28 day strength from the shop drawings, whichever is greatest.

The design Water/Cementitious Ratio (W/C) normally is set below the maximum allowable amount to account for variations in the materials used to determine this value. Good Quality Control by the Fabricator allows the W/C to be set closer to the maximum allowable amount.

ELASTOMERIC BEARING PADS

Elastomeric Bearing Pads include plain bearings that consist of elastomer material only and laminated bearings that consist of layers of elastomer material restrained at their interfaces by bonded laminates. The grade of the material is required to be as shown on the plans. The number, types, and sizes of elastomeric bearing pads are required to be as specified or as shown on the plans or approved shop drawings.

Not all bridges have elastomeric bearing pads. The plans are required to be checked to verify if bearing pads are required. If bearing pads are required, verify that the Fabricator has submitted a sample for testing to the Office of Materials Management in accordance with the Frequency Manual.